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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LAMPRECHT, JOEL

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/821,461	Applicant(s) CHEN ET AL.	
	Examiner JOEL M. LAMPRECHT	Art Unit 3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 7-11 and 15-19, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al (US 2005/0283072) in view of Lin (US 6,068,597). Qin et al disclose a method of characterizing the elasticity of a viscous medium (Claim 27), by directing an ultrasound wave, determining a vibrational velocity, determining a frequency response of the medium and determining an elasticity property as at least partially a function of the resonant frequency (Paragraphs 45-50, 55-58, Claim 13, Paragraphs 97-117). An amplitude modulated, confocal wave is used (Paragraph 37, Fig 1-2), known resonant frequencies are compared to known values (Paragraphs 12-13, 51 and 68, 69), and describes a method using multiple ultrasound sources (Paragraph 41). Qin et al describe sensing vibrational motion with an ultrasound based motion detector, detecting the shear modulus (Paragraph 64, 68 and Claim 21), using a biological tissue (Paragraphs 19-20), varying the focal point across the tissue (Paragraph 39-45), and a processing unit with memory unit to correlate the vibrational data, frequency data, compare that data to known frequencies (Paragraphs 16-21, 47, 73-80).

Qin et al do not disclose the use of the acquisition of a "resonance spectrum" from the plurality of data received during imaging to determine resonant frequency.

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Attention is then directed to the secondary reference by Lin, which discloses the use of ultrasound imaging for the acquisition of resonant spectrums of an object or target to acquire data from a range of vibrational frequencies to acquire resonant frequency data of tissue for velocity measurement (Figure 1-3, 5, Col 6 Line 18- Col 7 Line 13). The range of frequencies utilized is between 0 and 8 KHz (CIm 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated the teachings of Lin in the vibrational velocity methods of Qin et al for the purpose of acquiring diagnostic data about patient-specific medical conditions in the body (abstract).

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al in view of Lin as applied to claim 10 above and in further view of Mourad et al (US 6,875,186). Qin et al in view of Lin discloses the invention as claimed, in particular, a method of characterizing the elasticity of a viscous medium (Claim 27), by directing an ultrasound wave, determining a vibrational velocity, determining a resonant frequency of the medium and determining an elasticity property as a function of the resonant frequency (Paragraphs 45-50, Claim 13, Paragraphs 97-117). An amplitude modulated, confocal wave is used (Paragraph 37, Fig 1-2), known resonant frequencies are compared to known values (Paragraphs 12, 51 and 68, 69), and describes a method using multiple ultrasound sources (Paragraph 41). Qin et al describe sensing vibrational motion with an ultrasound based motion detector, detecting the shear modulus (Paragraph 64, 68 and Claim 21), using a biological tissue (Paragraphs 19-20), varying the focal point across the tissue (Paragraph 39-45), and a processing unit with

memory unit to correlate the vibrational data, frequency data, and compare that data to known frequencies (Paragraphs 16-21, 47, 73-80).

Qin et al in view of Lin does not disclose differentiating a first type of tissue from a second type of tissue, even though it would be a requirement to know which sort of tissue is being analyzed to specify bone tissue as a target, does not disclose searching for calcifications, nor characterization as a function of time, though the properties of resonance vibro-acoustography are time and frequency dependent. Attention is then directed to the secondary reference by Mourad et al which teaches the use of a similar system and method for the classification of tissues which are dead, dying, hardening, or undergoing pathological or immune responses. Specifically Mourad et al teach a method of characterizing tissues (Col 13 Line 25 – Col 14 Line 40) as a function of time to determine pathologies including a hardening or density change within tissues (Col 15 Line 15-27). It would have been obvious to one having ordinary skill in the art at the time of the invention to have used the ultrasound tissue classifications disclosed within Mourad et al in the ultrasound tissue property methods of Qin et al in view of Lin for the purpose of distinguishing tissue properties and classifying tissues differently based on pathologies.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al in view of Lin as applied to claim 1 and in further view of Blofgett et al (US 2004/0077949). Qin et al in view of Lin disclose all that is listed above, but fail to disclose the use of a laser vibrometer for the purpose of sensing the vibrational motion of the medium being studied. Blofgett in the area of ultrasonic tooth structure classification disclose a method for sensing vibrational motion with a laser vibrometer

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(Paragraphs 10-14). It would have been obvious to one having ordinary skill in the art at the time of the invention to have used the laser vibrometer method disclosed by Blofgett et al in the methods taught by Qin et al in view of Lin as it is a complimentary technique for the remote sensing of ultrasonic waves (Paragraph 12).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Qin et al in view of Lin as applied to claim 15 and in further view of Sarvazyan (US 5,606,971). Qin et al in view of Lin discloses the invention as described including all that is listed above, but fails to disclose the use of a magnetic resonance elastography system for the detection of velocity and frequency vibrations. Attention is then directed to the secondary reference by Sarvazyan which discloses in Figure 3 and columns 5 and 6, that both ultrasound systems and MR elastography systems are common and can be used for the classification and diagnosis of tissue properties. It would have been obvious to one having ordinary skill in the art at the time of the invention to have substituted an ultrasound based motion detector as taught by Qin et al in view of Lin for the MR elastography methods taught by Sarvazyan as they are both capable of detecting shear waves from a source (Col 5 line 60 –Col 6 line 6).

Response to Arguments

Applicant's arguments filed 10/6/08 have been fully considered but they are not persuasive. Regarding the argument that neither discloses the production of a vibrational force on the medium, Examiner respectfully disagrees. As was noted in the previous response, the “acoustic” ultrasound pulses of Lin and Qin inherently produce a vibrational force on the medium. Ultrasound, as with sonar, sends out waves of vibrational acoustic force which is measured either through a target or as reflected from

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a target, thus allowing for the measurements of density, time of flight, and velocity measurements as noted in Lin (Line Col 2 Line 50-Col 3 Line 10 for simple explanation of the properties sought). Respectfully noted herein would be the basis of (ultra)sound or acoustic waves, succinctly, "sound is vibration, vibration is sound". Directly in the abstract Lin notes that the focused vibrations are used to measure the according vibrations at the focus or target site. As noted from Col 1 Line 47-55, elastic properties are sought and on Col 6 Line 19-65, the corresponding properties are described as being derived from the resonance spectrum which is found within the reference. Qin, as noted by Applicant, uses the regression analysis to relate measured values of velocity to stiffness ($k=AE/L$ to solve for elastic modulus (0064, Qin)). Regarding the arguments surrounding newly added claim 22, it is noted that both 10-20Hz and 10-350Hz, as cited in the art of record to Lin are between zero and eight kilohertz.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL M. LAMPRECHT whose telephone number is (571) 272-3250. The examiner can normally be reached on Monday-Friday 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JML

/Ruth S. Smith/
Primary Examiner, Art Unit 3737